

South Puget Sound Dissolved Oxygen Study

DRAFT Version: May 4, 2010

Background

EPA and Ecology met in February 2010 to discuss the South Puget Sound Dissolved Oxygen Study. Ecology provided a briefing to establish a common understanding of the goals and status of this study. The briefing identified that:

- Work on this project began in 2006 and is currently under development by Ecology. Completion of the project is scheduled for 2011. Detailed what-if scenarios will be completed by 2012.
- Monitoring and circulation modeling work is essentially complete while water quality modeling is the major work remaining.
- Ecology clarified that at this point the study has not determined if pollutant loading from human activities are causing a violation of applicable state water quality standards. That determination will be presented in the final project report.
- The study area includes Central Puget Sound (which contains the largest wastewater dischargers in the state) to determine if these dischargers contribute to the water quality problems in the South Sound.

More information is available at

http://www.ecy.wa.gov/puget_sound/dissolved_oxygen_study.html.

Ecology and EPA identified six items needing follow-up:

1. Develop a script that we can all talk from regarding the water quality standards applicable to these waters, what they are designed to protect and how they work.
2. Develop an interim permit strategy for permits that come up for reissuance in advance of study completion. Chambers Creek and Fort Lewis were discussed specifically because these two and LOTT are the largest South Puget Sound dischargers. Make sure we are telling them that there are potential issues and that as we reissue permits we are taking them farther along the path to deal with nutrients. EPA will get back to us about what they plan to do with Fort Lewis since it is the closest to being issued. Look at language that NWRO used recently.
3. Develop messages for each agency to use on the Technical and Economic Evaluation of Nutrient Removal Technologies.
4. Set up meeting for EPA and Ecology to go over what-if scenarios.
5. Chart long-term facility planning/permitting issues for South and Central Puget Sound wastewater treatment plants.
6. Develop strategy and schedule for getting elected people / decision-makers / tribes engaged.

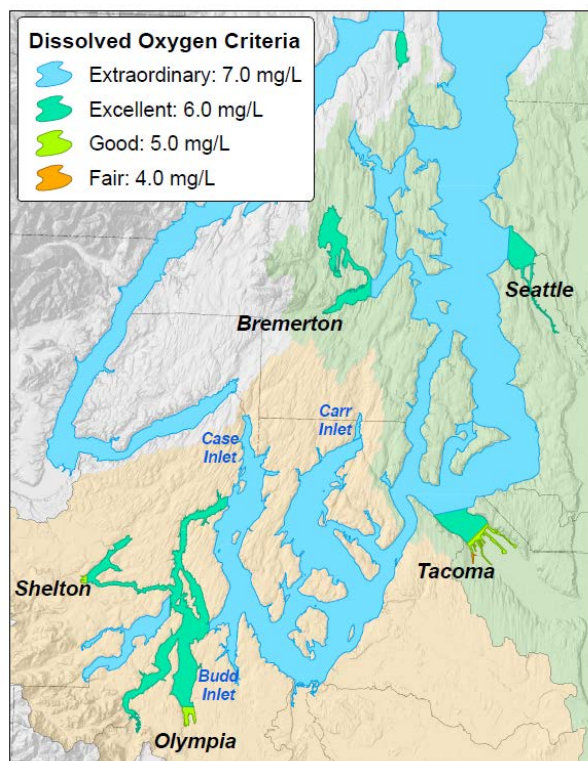
#1 Water Quality Standards

The state water quality standards for dissolved oxygen in marine water are found in WAC 173-201A-210(1)(d):

“Aquatic life dissolved oxygen (D.O.) criteria. Except where noted, D.O. concentrations are measured as a 1-day minimum in milligrams per liter. Table 210 (1)(d) lists the D.O. criteria for each of the aquatic life use categories.

Table 210 (1)(d)
Aquatic Life Dissolved Oxygen Criteria in Marine Water

Category	Lowest 1-Day Minimum
Extraordinary quality	7.0 mg/L
Excellent quality	6.0 mg/L
Good quality	5.0 mg/L
Fair quality	4.0 mg/L



- i. **When a water body's D.O. is lower than the criteria in Table 210 (1)(d) (or within 0.2 mg/L of the criteria) and that condition is due to natural conditions, then human actions considered cumulatively may not cause the D.O. of that water body to decrease more than 0.2 mg/L.**
- ii. Concentrations of D.O. are not to fall below the criteria in the table at a probability frequency of more than once every ten years on average.
- iii. D.O. measurements should be taken to represent the dominant aquatic habitat of the monitoring site. This typically means samples should not be taken from shallow stagnant backwater areas, within isolated thermal refuges, at the surface, or at the water's edge.”

The numeric criteria in Table 210 (1)(d) are exceeded throughout Puget Sound, even in areas with presumably little human influence. Thus the human allowance in 210(1)(d)(i) will be the important part of the criteria. How does this part of the criteria work? For a given segment, the model will predict what the dissolved oxygen concentration would be if human sources of nitrogen (WWTPs, septs, fertilizer use, etc.) were absent. We then compare this ‘natural’ dissolved oxygen concentration to the dissolved oxygen concentration with human sources of nitrogen present. If the difference is more than 0.2 mg/L, part (i) of the standard is violated. Often, the standards are misinterpreted -- such as “the DO is lowered mostly due to natural conditions.” In the context of the water quality standards this is not relevant; the difference between the numeric criteria in Table 210 (1)(d) and the natural condition does not matter. The important question is whether part (i) of the standards was met.

There are no plans to review the marine dissolved oxygen standards. These EPA-approved standards are expected to be in place for the duration of the South Puget Sound Dissolved Oxygen Study and the implementation of the study’s findings.

#2 Interim Permit Strategy for Chambers Creek and Fort Lewis

Fort Lewis:

EPA's proposed permit is currently undergoing consultation with the Services. The Services have expressed concern about PPCPs in the discharge and potential impacts on listed fish species (Bull Trout). The Fort's discharge is treated domestic wastewater and most likely contains the same amount of PPCPs as other secondary effluents. The final permit will be sent to Ecology for 401 certification after consultation is completed. With regard to nutrients, the proposed permit requires the Fort to monitor for nutrients and direct the discharger to conduct the following study:

UPDATED FEASIBILITY STUDY CONDITION IN THE PERMIT =

J. Feasibility Study and Engineering Report

The permittee must complete a feasibility study that considers alternatives for future wastewater treatment at Solo Point and must submit it to EPA for review. The study should include consideration of the current treatment plant's capacity limitations as well as projections of future flows and a plan and schedule for maintaining capacity. **The study should also include consideration of feasible alternatives for nitrogen reduction at the Solo Point WWTP.** The plan and schedule for maintaining capacity must be sufficient to achieve the effluent limits and other conditions of this permit. This plan must identify any of the following actions or any other actions necessary to meet the objective of maintaining capacity:

1. Analysis of the present design, including the introduction of any process modifications that would establish the ability of the existing facility to achieve the effluent limits and other requirements of this permit at specific levels in excess of the existing design criteria.
2. Reduction or elimination of excessive infiltration and inflow of uncontaminated ground and surface water into the sewer system.
3. Limitation on future sewer extensions or connections or additional waste loads.
4. Modification or expansion of facilities necessary to accommodate increased flow or waste load.
5. Reduction of industrial or commercial flows or waste loads to allow for increasing sanitary flow or waste load.

The permittee must also select the preferred alternative and prepare a subsequent engineering report based on chosen design alternative. Engineering documents must be submitted to EPA with sufficient time for review prior to any construction.

Chambers Creek:

The Chambers Creek permit expires in June 2013. The current permit includes monthly monitoring requirements for nitrogen. Ecology met with Chambers Creek staff in 2009 to discuss the South Puget Sound Dissolved Oxygen Study. Pierce County will submit a facility plan in the next few months. Ecology commented on the draft EIS for the plan, and we emphasized the importance of dissolved oxygen in Puget Sound and Chambers Creek's significant nitrogen loading.

Chambers Creek chose their preferred alternative (alternative #3) which includes nitrogen removal and some water reclamation.¹ Pierce County will submit the facility plan in the next few months and will complete the Engineering report by April 2011. In November the County Council passed the first rate increase to begin to cover the necessary improvements.

#3 Develop messages for each agency to use on the Technical and Economic Evaluation of Nutrient Removal Technologies

<http://www.ecy.wa.gov/pubs/0910062.pdf>

- The information generated by this evaluation will show what we can do about this problem and roughly what it will cost.
- This evaluation is not an AKART (all known, available and reasonable technology) study.

Not completed. Foroozan and Dave would lead this with Andrew helping as appropriate.

#4 Set up meeting for EPA and Ecology to go over what-if scenarios

Ecology discussed the what-if scenarios on April 8. Ecology and EPA staff (Andrew, Dave, Mindy?, Ben?, Laurie?) will meet in May to discuss the what-if scenarios. Staff will brief their management and, if needed, hold a larger meeting. Upon completion of the EPA-Ecology coordination, the external Advisory Committee will discuss the what-if scenarios.

¹ **Alternative 3: Augment Existing Level of Service – Partial Recycling (LOS 3):** LOS 3 includes expansions and upgrades similar to LOS 2. The main difference relates to the discharge of treated effluent. While a majority of the treated effluent would continue to be discharged to Puget Sound during the wet weather season, a portion of the treated wastewater would be diverted for reclaimed water production. Reclaimed water could be used in a number of ways, such as process water for the Plant, on-site irrigation, on-site groundwater recharge, or other off-site uses during the dry weather season.

Alternative 2: Augment Existing Level of Service – Marine Discharge (LOS 2): Under LOS 2, the Plant would be expanded to keep pace with increased flows and loadings from the sewer service area. In addition to facility expansion, treatment processes would be upgraded to provide an enhanced level of treatment to remove nitrogen. Non-process facilities would be expanded or upgraded to keep pace with state regulations and NPDES permit requirements, industry norms, and applicable building codes. Additional improvements would be made to address regulated odor sources.

#5 Chart long-term facility planning/permitting issues for South and Central Puget Sound wastewater treatment plants.

Plant Name	Permit Information (as of 3/2010)			Annual Average (Regressions)			Long-Term Facility Planning (in process)
	Permitter	Permit No.	Permit Expiration	Flow (mgd)	DIN Concentration (mg/L)	DIN Load (kg/d)	
Chambers Creek	SWRO	WA0039624	6/30/2013	19	41	2918	Updating general sewer plan. Will need to have more capacity by 2015, thus building soon. Estimated N removal at about \$70 million.
Tacoma-Central	SWRO	WA0037087	5/31/2009	21	30	2120	Completed a \$90 million upgrade & expansion project in 2009 that increased CTP capacity from 38 to 60 mgd. No future upgrade/expansion plans. Ecology will be funding Tacoma to determine feasibility / cost of N removal.
Tacoma-North	SWRO	WA0037214	6/30/2014	5.0	23	392	The City is hoping to re-rate the facility to accommodate higher influent loadings. The facility has no space for expansion. The City is not planning any upgrades in the near future. Ecology will be funding Tacoma to determine feasibility / cost of N removal.
LOTT	SWRO	WA0037061	9/30/2010	12	3.4	159	Completed 30% design for upgrade. Construction to begin in 2012. Upgrade targeting 2 mg/L TIN (currently 3).
Shelton	SWRO	WA0023345	3/31/2013	2.4	6.3	65	Started construction (January 2010) on upgrades to 4.4 mgd and <10 mg/L nitrogen.
Carlyon Beach	SWRO	WA0037915	6/30/2012	0.02	53	4	Facility can handle build-out within service area. No planned upgrades.
Boston Harbor	SWRO	WA0040291	6/30/2011	0.03	20	2	Upgraded about 7 years ago. No planned upgrades.
Hartstene Pointe	SWRO	WA0038377	6/30/2010	0.07	8.5	2	No planned upgrades.
Rustlewood	SWRO	WA0038075	7/31/2013	0.03	8.5	1.0	New facility in 2008. No planned upgrades.
Tamoshan	SWRO	WA0037290	12/31/2012	0.03	6.9	0.8	New facility, no planned upgrades.
Seashore Villa	SWRO	WA0037273	6/30/2013	0.01	8.5	0.4	New facility in 2007. No planned upgrades.
KC West Point	NWRO	WA0029181	6/30/2014	108	25	9805	Change from gas chlorine to liquid sodium hypochlorite in 2011-2012. No additional planned upgrades.
KC South Plant	NWRO	WA0029581	10/31/2014	80	33	9489	No planned upgrades.

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Lakota (Lakehaven)	NWRO	WA0022624	7/31/2013	5.1	41	783	Considering capacity re-rate. Study in progress, eng. rpt expected mid-2010.
Central Kitsap	NWRO	WA0030520	5/31/2012	3.8	32	453	Installation of new headworks is under way and expected to be completed by April 2011. Primary and secondary clarifiers upgrades - preliminary estimate is 2014 and 2015, respectively. Addition of a new (third) anaerobic digester - preliminary estimate is 2016. The design flow estimate for 2025 is 11.1. MGD. Construction date for plant expansion is not known yet. The County is planning to modify the plant equipment within the next three years to promote nitrification/denitrification.
Midway	NWRO	WA0020958	11/30/2010	4.6	25	418	No planned upgrades.
Bremerton	NWRO	WA0029289	9/28/2011	5.0	21	380	No planned upgrades proposed. Ecology will soon be approving the rerating of design flow for the West Plant – Dry Weather 11 MGD and Wet Weather 15.5 MGD.
Miller Creek	NWRO	WA0022764	6/30/2013	3.1	29	336	No planned upgrades.
Salmon Creek	NWRO	WA0022772	6/30/2013	2.7	29	284	No planned upgrades.
Redondo (Lakehaven)	NWRO	WA0023451	7/31/2013	2.9	23	238	Considering capacity re-rate. Study in progress, eng. rpt expected mid-2010.
Port Orchard	NWRO	WA0020346	6/29/2012	1.7	21	135	No planned upgrades. Reclaimed water pipeline construction is under way. Reclaimed water use for irrigation is expected to begin in summer 2010.
Gig Harbor	NWRO	WA0023957	7/28/2009	0.83	13	40	Phase I upgrades to be completed soon will include anoxic basins to achieve nitrification/denitrification. No emphasis is placed on performance criteria until Ecology specifies (effluent) nitrogen limits. Phase IIa upgrades are expected to be completed by October 2010. Phase IIb upgrades completion is targeted for October 2015, which will bring the plant capacity to 2.4 MGD. The City is planning on relocating the outfall to the deep waters of Colvos Passage within the next two to three years.

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	Permitter	Permit No.	Permit Expiration	Flow (mgd)	DIN Concentration (mg/L)	DIN Load (kg/d)	
Bainbridge Island (City)	NWRO	WA0020907	6/29/2012	0.55	8.5	19	Recent upgrade (2010) addressed redundancy concerns but did not increase plant capacity. Upgrades included: new headworks w/ odor control system, conversion of oxidation ditches to activated sludge basins with fine bubbler diffusers and selectors, clarifier improvements, new solids dewatering facility.
McNeil Island/DOC	NWRO	WA0040002	7/15/2010	0.2	8.5	8	No planned upgrades proposed.
Manchester Kitsap Co	NWRO	WA0023701	2/25/2013	0.21	8.3	7	No planned upgrades proposed.
Vashon	NWRO	WA0022527	8/31/2011	0.15	8.5	5	No upgrades planned.
Kitsap Co Kingston	NWRO	WA0032077	5/2/2010	0.12	8.5	4	No planned upgrades proposed. The County is currently conducting a feasibility study to use reclaimed water for wetlands enhancement.
Kitsap Co Sewer Dist 7 (Bainbridge/Fort Ward)	NWRO	WA0030317	6/30/2011	0.09	8.5	3	No planned upgrades.
Taylor Bay (Longbranch)	NWRO	WA0037656	10/31/2010	0.01	8.5	0.3	No planned upgrades proposed.
Simpson Kraft	Industrial	WA0000850	11/15/2013	20	0.19	15	
US Oil	Industrial	WA0001783	8/1/2013	0.49	0.32	0.6	
Fort Lewis/Solo Point	EPA	WA0021954	2/1/2009	3.9	29	424	Joint Base Lewis McChord currently has requested funding for \$60-100 million for the construction of a new treatment plant, or alternatively for \$40-50 million to upgrade the existing facility and to include tertiary treatment. Currently targeting startup of new or modified facility circa 2015.
Kitsap Co Suquamish	EPA	WA0023256	5/31/2013	0.22	8.5	7	Last upgraded in 1998. No planned upgrades at this time.

#6 Develop strategy and schedule for getting elected people / decision-makers / tribes engaged.

TBD. It is important to engage stakeholders both before and after the study is finished.

EPA will lead in communicating with decision-makers with the Fort Lewis WWTP.

EPA will assist Ecology in communicating with affected tribes. The Squaxin Tribe has been very involved in the study and has served on the advisory committee. However, other tribes have not been heavily engaged.